



UNITED NATIONS
ECONOMIC AND SOCIAL COUNCIL



Distr.
LIMITED

ST/ECA/SM/4
17 August 1981

Original: ENGLISH

ECONOMIC COMMISSION FOR AFRICA
Seminar on Household Surveys
Addis Ababa, 21-30 September 1981

TECHNICAL PLANS FOR FOOD CONSUMPTION
AND NUTRITION SURVEYS

C O N T E N T S

	<u>Paragraph</u>	<u>Page</u>
SCOPE, PURPOSE AND USES OF THE DATA.....	1-32	1-9
PRINCIPAL ITEMS OF INFORMATION.....	33-41	9-12
CONCEPTUAL ISSUES.....	42-73	13-20
SPECIAL SAMPLING AND OPERATIONAL ISSUES.....	79-105	20-26

SCOPE, PURPOSE AND USES OF THE DATA

1. The use of multisubject surveys combining food consumption and nutrition topics with household income and expenditure topics has been found to be the best means of providing data on levels of living of households including their food consumption patterns and nutritional status, suitable for a wide variety of uses in policy formulation and programme planning.
2. In general, two approaches have been used in measuring the household's levels of living and related factors. The first approach, adopted by nutritionists, has been concerned mainly with the evaluation of nutritional levels of households and individuals, using survey techniques centered on the measurement of food actually consumed. The second approach, which is usually adopted by economists and statisticians, has sought ways of improving the accuracy of the measurement of household income and expenditure in surveys centred on the measurement of food purchased or acquired. Both these approaches which have tended to be undertaken in the narrow perspective of their respective disciplines, have encountered several limitations in meeting their objectives.
3. Specifically, most nutritional surveys have tended to cover limited segments of the population. Because of their small sample size and the lack of adequate information on household income and expenditure, the data furnished have been of only limited value in explaining the food consumption behaviour of households. Thus, while the approach adopted in such surveys makes it possible to obtain reliable information on food consumption and dietary standards, the extended scope of the multisubject survey covering household budgets allows for the investigation of a wider range of socio-economic aspects of the households' levels of living. In the case of household income and expenditure surveys using the concept of food acquired, it has been found difficult to obtain reliable estimates of quantities of food consumed in countries where staple foods are purchased and stored over a long period or where home-produced foods and the food gathered from the field and home gardens constitute the major portion of the diet. Here again extending the scope of these surveys to cover food consumed has been found to be the best means of overcoming these types of deficiencies.
4. A few national household surveys combining the two types of surveys mentioned above have shown that the extension of the scope of the investigations as indicated above, through a multidisciplinary approach and with multiple objectives, enables a fuller assessment of the populations' levels of living against a wide range of explanatory variables, as well as the study of corrective factors on which policies and programmes can be based. Multisubject surveys of the type indicated are, therefore, one of the best means of providing integrated information on levels of living of households including food consumption and nutrition. They provide more useful information for cross-analysis purposes than a collection of specialized inquiries conducted to serve

the needs of their individual disciplines. It is in the light of such integrated surveys that the purposes and uses of food consumption surveys, as well as the scope and methods to be used, will be discussed.

I. Some general uses of food consumption survey results

(a) Estimating the consumption and production of certain foods

5. Food consumption surveys provide in the majority of countries where they have been conducted the only usable information on consumption of food from non-commercial sources. Examples are the consumption of milk from a goat or cow, consumption of food from home gardens, of family poultry, and of game and fish caught by family members or bartered. In certain cases, these surveys may be the only available source of information on the output of root crops such as cassava and yams, whose production cannot easily be estimated through the classical methods of measuring crop areas and yield. They are also an invaluable source of production data for food items that are grown wild.

(b) Providing weights for cost of living indices and estimates of private consumption expenditure

6. Food consumption survey results are also useful for the derivation and updating of the weighting systems used in cost of living and related price indices. Since food constitutes a high percentage of the total private consumption expenditure in the developing countries, the data on expenditure on food need to be provided with greater detail in order to determine the changes in the relative weights of various food groups and in weights of food and non-food items.

7. Food consumption and expenditure survey data also provide estimates of private expenditure for national accounts and balances.

(c) In-market research and development of the food industry

8. Food consumption survey data contribute useful benchmark data for market research to deal with problems arising from the wider use of imported, commercially produced or marketed foodstuffs. They enable study of characteristics of various users and non-users of particular food products and of potential buyers for commercially marketed foodstuffs. Since market researchers often focus their efforts on a few products, food consumption data permit the study of how other foods are interrelated with these. Such information is highly relevant to expanding the market for existing products and assessing the potential market for the new products. Producers, manufacturers and distributors are constantly concerned with appraising the future demand for their products. Such research is particularly important in developing countries because the modern food industry requires heavy investment in manufacturing and distribution facilities for which they can only establish at the expense of the scarce foreign exchange.

(d) In agriculture, food and nutrition planning and programming

9. Food consumption surveys are the only source of data for the measurement of variations in consumption of all food and of particular foods by source, by season according to consumer characteristics and among geographical areas. In addition, they provide the only data available for measuring the relationships among the variations in patterns of foods consumed and nutrient supplies on the one hand and between variations in food consumption, food intake, nutritional intake and demographic, socio-economic, cultural, environmental and institutional factors and conditions on the other. The results of such measurements constitute an important component of the data base for agricultural nutrition and health planning, public programme administration and, as already indicated, food market research.

10. Food consumption survey results contribute directly to the specification of what the nutritional problems are, who they affect and why they exist. Such assessments are required for realistic and effective programme planning, administration and evaluation - both in relation to a particular point in time and over periods of time. The results of such measurements are also used in studying the processes related to food marketing and family food use; the aggregate patterns of food choice and use, family characteristics and their aggregation of income, marketing activities and consumer activities, and the systems of which these processes and structures are a part.

11. Information on the patterns of relationships between kinds and amounts of particular nutrients provided by the combination of foods for particular diets is essential for nutritional research on certain types of deficiency problems. Still another type of research on income and poverty related problems make extensive use of food survey data. Because human needs for food are more easily estimated than other basic needs, the identification and measurement of poverty begin with survey data on dietary adequacy among various income groups. Information on the incidence of poverty and the associated factors is basic to national planning strategies aimed at the reduction of poverty and the attainment of basic needs.

(e) Estimating demand for food

12. Since food consumption surveys integrated into a general household survey or survey programme allow quantification of interrelationships between food consumption and other variables such as size of households, income, etc., the results of such surveys can be used to forecast the effects of factors such as changing economic and social policies on future food consumption. Population increases which are accompanied by structural changes in the population itself will lead to a defined increase in demand for food which can also be determined on the basis of food consumption survey results. Income changes and industrialization and urbanization may cause similar effects and these may entail changes in food production and foreign trade policy of a country. Food consumption surveys provide the data required for study of all these changes.

(f) Determining the effects of subsidy programmes

13. Food consumption surveys can be used to determine the impact of food subsidy programmes on food consumption patterns and nutritional status of the population. The analysis of both time series and sectional data obtained from food consumption surveys is required for these purposes. Such analysis can determine the direct and indirect effects of subsidy programmes, for example, the contribution of food rations to food intakes and nutritional status of various socio-economic groups, the effects of rations on non-market prices, the substitution of rations purchased for commercial purchasing and the effects of subsidy programmes on income and demand for food.

II. Survey needs, scope and objectives

14. Wherever possible, and in order to meet the objectives and uses of data discussed above, food consumption surveys should be carried out on a national scale and be representative of the country as a whole and smaller geographical areas. Such surveys provide the information required for overall planning purposes at territorial decision-making level. However, there is a case for surveys covering special population groups or geographical areas whose results may serve adequately the special problems of these groups or areas, provided adequate samples are covered, devised preferably as subsamples of an overall national integrated survey programme. Food consumption surveys should normally be representative of the non-institutional population not living in collective living quarters. However, hostels, boarding and lodging houses, institutions, camps, etc., may also need to be covered in such surveys. Special concepts and methodology must be developed for the coverage of these categories of the population.

15. The economic and nutritional objectives of most household food consumption surveys make it desirable that the overall period of the survey should cover at least a twelve-month period. Surveys which represent a shorter period than a year may give results which are not typical of the year as a whole. They can be affected, for example, by the observance of religious festivals and customs as well as by seasonal factors. In most of the countries, the consumption of food is very much dependent on the items of food available during a particular season and perishable foods are available only in the season of their harvest. All these factors can affect the validity of the survey results if they are not accorded their correct representation over a full year.

16. The usefulness of the results of food consumption surveys does not lie only in determining the present consumption patterns of the population of a country. It is also equally important to note their changes over time. For the majority of the developing countries, excepting periods of natural disaster from drought, floods, etc., and certain areas that may be subject to rapid changes in consumption behaviour, food consumption patterns are not likely to exhibit abrupt changes in a country as a whole over a short period of time. Since the action programmes to be adopted would normally be implemented as

part of a development plan, the data derived from a food consumption survey all not only useful for preparing the plan document but also in evaluating the achievements of an earlier plan. Food consumption surveys should therefore be synchronized as closely as possible with the timing of national development plans, which are generally at five-year intervals.

17. The conduct of a comprehensive survey covering household budgets and food consumption may be, under certain situations, an expensive and difficult operation which some countries cannot easily afford. In countries where statistical systems are not yet fully developed and where food consumption patterns are not likely to change drastically over a short period of time, it is useful to repeat food consumption surveys after ten years or so. In such cases, it is advisable to set up some small-scale, low-cost surveys between comprehensive food consumption surveys, in order to update the data at shorter intervals.

III. Nature, uses and limitations of types of surveys providing data on food consumption and nutrition

18. The purpose and uses of the various kinds of food consumption and nutrition statistics and their general limitations depend largely on the type of survey from which they are obtained and the conditions which prevail in the country carrying out the survey. To some extent different types of household surveys can be classified according to the degree of complexity with which they measure food consumption, and this degree of complexity is frequently correlated with resource cost per unit of information required. Depending on a country's needs for data and the uses to which they should be put, such a classification might suggest an order in which successive surveys can be undertaken at various stages of development of a household survey capability.

19. There are four main types of specialized surveys which provide statistics of food consumption and nutrition in countries, and these sources will be reviewed from the point of view of their nature and the uses, limitations and improvements that can be made to the type of data furnished. These sources are:

- Household budget surveys;
- Household food consumption surveys;
- Individual dietary surveys;
- Nutritional status surveys.

(a) Household budget surveys

20. The household budget or expenditure survey which is often undertaken in developing countries, is an important source of information on food consumption and expenditure, but the food record is less detailed as compared with that of specialized food consumption surveys. These surveys normally provide information on the amount of money spent on food and other articles purchased. However, they sometimes do not cover the consumption of own-produced food, which is an important part of food consumption, particularly in rural areas

of developing countries. As far as the food expenditure part of the record is concerned, the requirements of the survey may be met by a less detailed classification of foods than is required for a specialized food consumption survey. Indeed, the whole of the food part of the record may be much simpler than that in a food consumption survey.

21. There are, however, some household budget surveys providing full tabulations of data on quantities of food acquired or consumed. Data on quantities of food acquired or food consumed are often collected in the developing countries, but not always processed or presented in the final survey results. In the case of own-produced and bartered food, it is necessary to collect information on quantity prior to arriving at consumption in monetary terms. Because of the wide range of purposes which they serve, there is much to be said in favour of a country initiating a household budget survey, particularly if home-produced food is recorded, before it extends its survey capability to include more specialized surveys on food consumption.

22. Household budget surveys, as already indicated, provide information on food expenditure in relation to expenditure on all other items in the household budget and in relation to income. Moreover, they usually provide this information not only at national level but also for each of the socio-economic or other population groups identified in the survey. If the surveys are conducted throughout the year they give information on seasonal changes, and if they are also from year to year or at regular intervals, they enable longer term trends to be detected and analysed. The surveys thus provide a factual basis for policy making in connexion with the social and economic aspects of food and agricultural planning, and for monitoring the effects of changes in such policies. They enable the relationships between family size or structure, income and levels and patterns of food and other expenditure to be determined, and thus make it possible to assess, on the assumption of unchanged prices, the expected growth in value terms of market demand for agricultural products as levels of living rise. For the construction of more refined econometric models which take into account price changes and enable forecasts of market size to be made both in value and in quantitative terms, adequate data on quantities of food purchased or consumed by households are required.

(b) Household food consumption surveys

23. Household food consumption surveys, which are more specialized than household budget surveys, can be undertaken in various forms which, nevertheless, have a number of essential features in common. Their main characteristic is that they are sample surveys which collect information at the household level on quantities of food consumed (or acquired for consumption).

24. In their most comprehensive form they cover all sections of the household population, all regions of the country, and all seasons of the year. Moreover, when they are carried out on a continuous basis, they enable changes and trends over time to be determined and analysed. They record not only expenditure on each type of food but also quantities of food purchased and food consumed in sufficient detail to enable estimates of nutritional intake to be derived. They may also obtain information on age, sex, weight, height, and occupation of individual members of the household (together with similar information on any visitors taking their meals within the household) and information on family members who have taken meals away from the household. In this way nutritional requirements can be calculated in accordance with suitable national or international recommendations and the nutrient intake of the households compared with the estimate of their requirements. In addition, such surveys obtain information on incomes and other household characteristics for purposes of analysis and classification of the survey data.

25. In their less complex forms these surveys may omit some of the above features. Thus, they may be confined to specific sectors of the population or to restricted periods of the year. The recording of quantities of foods may be simplified considerably by recording only food acquired during the recording period as distinct from food actually consumed. The recording of particulars of people present at each meal may be omitted and so on. Such simplifications restrict the uses which might be made of the data. In countries with more limited statistical capabilities, the more complex types of survey can be deferred.

26. The inclusion of information on quantities of foods in a household survey immediately opens up a wide range of statistical and policy uses which a survey can serve. It produces in the first instance a data bank of detailed information in quantitative terms that may be used to determine the patterns of food consumption in different socio-economic, cultural and geographical groups that may be sufficient to identify and measure the extent of problem areas. It may also enable relationships between household characteristics and levels of food consumption to be determined which can then be drawn upon in the formulation of policies to alleviate the problems this information has brought to light. Quantitative information on food consumption can also be used to evaluate it in terms of its energy and nutrient content, and then related to nationally or internationally recommended levels of intake. This process delineates important nutritional problems and provides a basis upon which the policies likely to be most effective in the solution of those problems can be formulated.

27. The collection of information on quantities of food purchased and the expenditure thereon implies that average food prices for different products by different groups of households can be derived. These prices are in fact more representative of the composition of food items than average consumer prices obtained separately. Such average prices may, under certain conditions, be more apposite to studies of levels of living and differences in levels than are the average prices of "indicator" items from a sample selection of shops

on a specified day. A further advantage of having quantity data and price data which are perfectly matched because they are from a common source is that they are particularly suitable for the determination of price elasticities of demand. These, in conjunction with income elasticities and other demand parameters, enable econometric models to be constructed for use in making demand projections and for forecasting the effects of changing economic and social conditions and policies on the patterns and levels of consumption of food. Caution must be exercised, however, in interpreting the effect on food demand of changes in food acquisition from home-produced to purchases from the market.

28. In all the above aspects, the availability of the data both at national level and for various population groups means that they will serve as an aid to the formulation not only of national policies but also of policies which differentiate among social groups. Although the consumption data which are used for the above-mentioned purposes relate to consumption by the households as a whole and not to that of individual members of the household, they do enable equivalent consumer scales to be estimated by the use of appropriate statistical techniques. Such estimates, though likely to be different from scales obtained by direct measurements of individual consumption, may be sufficiently accurate to guide policy and in such cases their use can eliminate the need to carry out more costly individual dietary surveys of the type discussed below.

(c) Individual dietary surveys

29. The main characteristic of individual dietary surveys is, as the name implies, that they measure the food intake of individuals and not simply consumption by the family as a whole. They may cover all members of a family separately or only a specific category of persons in the family, depending on the objectives of the survey, for example, pre-school children, children of school age, pregnant women, etc. They therefore entail compiling for each individual in the sample a complete record of the amount and description of every item of food eaten during the enquiry. The object may be to obtain a clear picture of the type of diet and its defects, prior to initiating a supplementary feeding programme or some other measure for improving nutrition. It may be the scientific investigation of the relation of diet and health or of problems relating to food intake and physiological requirements.

30. The methods used are exacting, as they may require that foods be measured or weighed on the plate or at the time of serving, thus leading to a high degree of response error.

31. These surveys are costly to undertake, and for that reason alone they usually have limited coverage geographically and over time and they tend to be confined to selected socio-economic or other population groups. Indeed, they are used mainly as follow-up surveys on vulnerable groups which have been highlighted or identified by the type of food consumption survey discussed above, and for which additional information

is required relating to the distribution of the household food supply within the family. In this way, specific types of person at risk can be precisely identified and enumerated and their levels of nutrient intake measured. When individual dietary surveys are thus linked to, or combined with, household food consumption surveys, they enable the various social, economic and cultural factors which contribute to dietary inadequacies to be identified.

(d) Nutritional status surveys

32. Individual dietary surveys do not in themselves permit nutritional status to be assessed since they only obtain information on an individual's food consumption and its energy and nutrient content. To obtain comparative information about an individual's energy and nutrient requirements, and also to assess nutritional status, it is necessary to make clinical and anthropometric measurements. Such information on nutrition is required for introducing nutrition considerations into national policy-making and planning and for monitoring consequent changes in nutrition. Essentially two forms of information are relevant. First, to identify population groups - in geographical and socio-economic terms - affected by malnutrition, and to determine the extent to which they are affected. For this purpose, data on nutritional status and related indicators - notably morbidity and mortality - are required in disaggregated form in order to describe the nutrition conditions of different groups. This enables priorities to be set up and changes monitored. Second, information on food consumption, food expenditure, income, etc., is required. This provides more detailed knowledge of casual factors, enables projections of changes in nutritional conditions to be made, and again provides information for monitoring and evaluation.

PRINCIPAL ITEMS OF INFORMATION

33. Depending on the objectives in view and the type and scope of the food consumption survey to be undertaken, the list of items of information which may be collected on food consumption and nutrition and related characteristics of households and members of their families are presented below. The scope of the items to be included will depend to a large extent on the purpose for which the survey is undertaken. For convenience, the items are grouped under three main headings: items on food consumed or acquired, items on household characteristics and items on characteristics of individuals. No distinction is made between the items of primary data as presented in the questionnaire and those relating to derived topics.

List of items for food consumption surveys

1. ITEMS ON FOOD CONSUMED OR ACQUIRED

(a) LIST OF ITEMS OF FOOD CONSUMED OR ACQUIRED IN TERMS OF QUANTITIES AND EXPENDITURE

- (b) SOURCES OF FOOD
 - (i) PURCHASED
 - (ii) HOME-PRODUCED
 - (iii) OTHERWISE OBTAINED
- (c) OTHER INFORMATION NEEDED TO COMPLETE FOOD CONSUMPTION DATA
 - (i) INFORMATION ON FACTORS AFFECTING THE NUTRITIVE VALUE OF FOOD CONSUMED
 - (ii) INFORMATION ON FOOD HABITS, PREFERENCES AND RESTRICTIONS

2. ITEMS ON HOUSEHOLD CHARACTERISTICS

- (a) HOUSEHOLD SIZE (NUMBER OF PERSONS IN THE HOUSEHOLD)
- (b) AREA OF LAND IN POSSESSION OF THE HOUSEHOLD
- (c) INCOME OR OTHER MEASURES OF FINANCIAL STATUS OF HOUSEHOLD, e.g., PER CAPITA CONSUMER EXPENDITURE, OR HOUSEHOLD ASSETS AND AMENITIES
- (d) FARM/NON-FARM STATUS AND RURAL/URBAN
- (e) HOUSEHOLD MEANS OF LIVELIHOOD
- (f) HOUSEHOLD SOCIAL/ETHNIC GROUP

3. ITEMS ON CHARACTERISTICS OF INDIVIDUALS

Characteristics of household members

- (a) SEX
- (b) AGE
- (c) RELATIONSHIP TO HEAD OF HOUSEHOLD
- (d) PHYSIOLOGICAL STATUS (PREGNANT OR LACTATING WOMEN 15 YEARS AND ABOVE)
- (e) MARITAL STATUS
- (f) OCCUPATION
- (g) EDUCATIONAL STATUS
- (h) RESIDENTIAL STATUS
- (i) NUMBER OF MEALS TAKEN IN GIVEN DAYS (REFERENCE PERIOD)
 - (i) AT HOME
 - (ii) OUT OF HOME
 - (-a) CASUAL
 - (-b) REGULAR
 - FREE OF COST
 - AT SUBSIDIZED RATE
 - AT MARKET RATE

Anthropometric measurements of household members

- (j) BODY WEIGHT
- (k) HEIGHT
- (l) MID-ARM CIRCUMFERENCE
- (m) SKIN-FOLD MEASUREMENT

I. Items on food consumed or acquired

(a) List of food consumed or acquired in terms of quantities and expenditure

(i) List of food items

34. Information on both quantity and money value of food consumed or acquired should be collected in food consumption surveys, whether feasible. Food is generally supplied to the members from a common source in a household. Over and above this, some food is either received or purchased and consumed outside by the household members. Ideally, information should be collected on consumption of all food items, irrespective of whether consumed at home or outside.

35. The type and amount of detail required for this purpose is indicated in the Annex to the document ST/ECA/SM/5. The food items shown in each group are given only by way of illustration. In a particular country some of these items may not be consumed at all and some other items not listed may be commonly consumed. It is neither possible nor necessary to give here a full list of important foods of all countries.

(ii) Food from common supply and food eaten away from home

36. Food from the common supply and purchased food eaten away from home should be classified separately. Thus, the money values per household of all foods (including beverages) used at home by source are generally supplemented by estimated expenditures for food (meals and snacks) purchased and consumed away from home by family members. In areas where family members receive meals as pay or in school without pay, their value should also be measured.

(iii) Categories of food consumed according to stage of processing

37. Consumed items of food may be classified into two different categories. The first category of items usually includes basic items which are either consumed directly or after slight processing or cooking. The second category includes prepared foods like cake, ice cream, candy, certain beverages, cooked meals, snacks, etc. Direct assessment of their nutrient content is rather difficult.

38. The kinds of processed foods, prepared dishes and wholly or partially prepared mixtures of food available on the market in many countries have been increasing in recent years. Thus, for purposes of market analysis as well as for nutritional analysis, it is not only necessary to obtain, for example, data on the consumption of various types of fruit and vegetables, but also on whether they were purchased in fresh form, or canned, frozen, dried, or strained or chopped as baby food.

(iv) List of nutrients

39. Most of the essential nutrients required for a healthy life are obtained from the food consumed. Insufficient intake of particular nutrients may result from the quantitative deficiency of a particular variety of food in the food basket. For determining the intake level of nutrients, not only an account of the items of food consumed is necessary but also precise estimates of the nutrient contents of each item of food consumed. Estimations of nutrient content of individual food items are based on food composition tables. The nutrients for which average intakes should be calculated include the following.

1. Energy value
2. Fat
3. Protein
4. Carbohydrate
5. Calcium
6. Iron
7. Thiamin
8. Riboflavin
9. Nicotinic acid equivalent
10. Vitamin A (retinol equivalent)
11. Vitamin C.

(b) Sources of food

40. It is already been indicated that food consumption surveys collect data on consumption of individual food items either separately or in combination. The data should include quantity measures of actual use, usually identification as to source - purchased, home-produced and otherwise obtained - and prices paid and/or money paid. This information is of particular value in formulating food and nutrition policies and for economic and social analysis. It also facilitates the estimation of food production on the basis of food consumption surveys.

(c) Other information needed to complete food consumption data

41. In addition to information on food consumption in terms of quantities and expenditure, other relevant information on factors affecting the nutritive value should be obtained, for example, on moisture content, local food preparation practices, recipes of composite foods, etc. For interpretation and general policy purposes, qualitative information on food habits, such as preferences and restrictions is of great importance and should be collected wherever feasible, especially in food consumption surveys undertaken in developing countries. However, such information can be better collected by means of a village or community-level questionnaire. Some additional requirements are items on breast-feeding and weaning practices that can be incorporated into a food consumption survey.

CONCEPTUAL ISSUES

42. This section will cover the concepts and definitions and characteristics of reporting units and their composition as related to food consumption and nutrition surveys. It will consider the concepts relating to food consumption and food intake measured in different survey approaches and the definitions and explanations of the main items for which data are collected and analysed in these surveys.

I. Choice of reporting units

43. The reporting unit to be used depends on the objectives and the type of survey being undertaken. The household is commonly the sampling and reporting unit in household surveys. This is convenient where the household corresponds to the eating and budget units but where this is not the case, as in some rural parts of some developing countries, the reporting unit may have to be adapted to the eating unit in the case of food consumption surveys and to the budget unit in the case of household budget surveys. The individual is the reporting unit in the case of individual dietary surveys. In some cases, for example, for the recording of consumption of meals outside the home or prepared meals, it might also be necessary to turn to catering establishments or food industries as the reporting units.

(a) Concept of household

44. In international recommendations for population censuses, the concept of household is based on the arrangements made by persons, individually or in groups, for providing themselves with food or other essentials for living. A household may be either: (a) a one-person household, that is, a person who makes provision for his own food or other essentials for living without combining with any other person to form part of a multi-person household, or (b) a multi-person household, that is, a group of two or more persons who make common provision for food or other essentials for living. The persons in the group may pool their incomes and have a common budget to a greater or lesser extent. They may be related or unrelated persons, or a combination of both. Households usually occupy the whole, part of, or more than one housing unit but they may also be found living in camps, in boarding houses or hotels, or as administrative personnel in institutions, or they may be homeless. Households consisting of extended families which make common provision for food, or of potentially separate households with a common head, resulting from polygamous unions, may occupy more than one housing unit.

45. The concept of household commonly used in surveys combines three criteria: common housing, common budget and sharing of meals from the same kitchen. The attainment of the objectives of a food consumption survey presents no theoretical difficulties where the demographic household, the budgetary unit household and the food consumption unit are the same. However, in survey practice, the units may not be the same and it becomes necessary to establish a consistent framework for reporting unit.

46. A typical example is that of the compound found in certain countries, which may contain several housing units. It is possible in this situation to identify households by linking the recognized head of the household with the resident members. Generally, each housing unit within the household compound has its own kitchen or fireplace for preparing meals, but meals are either taken in common or in small groups at the compound level. In this case, the compound can be regarded as the basic eating unit. This eating unit corresponds in this case to various housing units, identified separately in terms of the dwelling criterion.

(b) Concept of eating unit

47. The eating unit is generally defined as a group of people whether related by kinship ties or not, who share meals eaten in an independent household and which come from a common stock. By extension in the case of more complicated situations, it is the "group of people habitually sharing together or in small groups meals prepared in the same kitchen or in several common kitchens".

(c) Concept of budgetary unit

48. A budgetary unit is a group of people who habitually reside in the same housing unit, share meals, pool earnings and participate in their expenditure under the authority of a unit head. In certain situations, women or other earners within the budget unit may keep and operate their own incomes separately. Their financial resources are usually small as compared with the budget of the unit as a whole. In this case, the concept of a secondary budgetary unit representing a subset of the main budgetary unit has sometimes been used in national household surveys.

49. Among persons living in the same housing unit, the nature of the relationship between the residents enables the identification of persons who are not members of the corresponding budgetary unit. A satellite budgetary unit has been defined as a person or group of persons residing in a housing unit associated with a budgetary unit and meeting the following conditions: they share the meals of the budgetary unit and have a contractual relationship to it either through their remuneration for work done (household employees) or through payment for services received (boarders).^{1/} The case most generally found in survey practice is that the eating unit coincides with the budgetary unit, and resides in a single housing unit. In this situation, the sampling unit is the housing unit and this also corresponds to the reporting unit. In the complex cases the budgetary unit is usually chosen as the sampling unit, and then the eating unit is identified relative to it. As a result, two reporting units, namely the budget and the eating units, have to be covered in the collection of data. At the stage of compilation and tabulation it is necessary to adopt procedures that enable the collation of consumption data with data on the household budget.

^{1/} It is recommended that where the number of boarders or lodgers exceeds five, they be classified and treated separately as households living in collective living quarters.

II. Characteristics of individuals within the reporting units

50. The collection of data on members of the reporting unit has two objectives, firstly to identify the members of the reporting unit and secondly to procure data required for analysis of the results.

(a) Members of the reporting units

51. The first criterion for determining the members of the reporting unit is based on the notion of presence or residence in the housing unit. Temporary visitors who happen to sleep in the housing unit and short-term guests are not usually considered as permanent or usual residents. However, guests who have been staying over longer periods are generally considered as residents. An absent member of the family may be included as resident in the housing unit if his or her absence is only temporary, for example, at school, university, travelling, etc. However, to be so classified, the absence of these people should not exceed a certain period, for example six months.

52. When the group of residents has been established, it is possible, according to the definition given before, to identify members of the budgetary unit. Resident boarders and household employees constitute one or more satellite budgetary units. However, when servants or boarders who are residents share the household food supply and accommodation without receiving remuneration for their work or providing any payment for services received, they should be included as full members of the budgetary unit. If there are several budgetary units in the same housing unit, the tie of dependency vis-à-vis one or another budgetary unit comprises the household members, usually centering on a budgetary unit, plus boarders, household employees who are not residents, temporary visitors who sleep in the household and guests who are present at one or several meals. From such a classification of the members of the reporting unit, one can derive the size of the housing unit, the size of the budget unit and the number of participants at meals.

(b) Daily dietary unit

53. A study of the flow of participants at meals shows that the size of the eating unit is not constant. Participants do not necessarily have the same eating rhythms every day. Within the rhythm of their daily consumption, they may be present or absent at one or more meals within the eating unit. Moreover, visitors may be present at a meal and numerous guests may also participate, especially on occasions of religious festivals and family celebrations.

54. All daily meals are not equivalent in nutritive value and their share, in terms of nutritive value, depends on the number of meals taken in a day. A study of the daily food intake record by meal provides the basis for rating meals. An individual present at every meal according to his or her own eating rhythm is counted as a full-time consumer and valued at 100 units. For the number of days in a survey period, each individual may be converted into fractions of this unit in order to obtain his or her total daily index of attendance at meals for the reporting period. This index is usually used to calculate the individual nutritional requirements.

55. The sum of the individual indices at the eating unit level constitutes the daily dietary units of the eating group. These daily dietary units are the figures used in calculating the per capita consumption of foods, calories and nutrients as well as the per capita monetary value of the diet used for nutritional purposes. For calculating the index of attendance and the daily dietary units, it is necessary to record day by day the eating rhythm of every participant. Mention of meals taken outside the home is also important not only for evaluating the individual eating rhythm but also to identify the meals taken at restaurants, school, work place, etc., or with other families in order to estimate the total consumption of individual households in the country.

(c) Anthropometric measurements and nutrition units

56. Individual energy and protein requirements are calculated on the basis of bodyweight. However, the data on height should also be recorded in order to obtain suitable adjustments of nutritional requirements taking into consideration the normal weight-for-height of individuals of given sex and age as derived from large-scale food consumption surveys. As has already been indicated, data on weights and heights are also used as indicators of the nutritional status of individuals within the family.

57. Reference to the median weight for median height by age and sex as derived from the survey allows for the estimation of the average energy requirements per day by age and sex. These figures are used to prepare scales of nutrition units, taking a male adult of 25 years of age with moderate activity as a standard. Such a scaling system permits the standardization of food consumption and nutritional data for use in comparisons made between different sets of results. The main fluctuations that result from differences in the age composition and size of households disappear once the data for individuals have been expressed in terms of their adult equivalents.

58. Applied directly to the members of the budget unit, this scaling system usually provides a good measure of consumer units suitable for use in the econometric analysis of the results of food consumption surveys. When the index of attendance at meals is weighed by the adult equivalent units and summed up at the eating unit level, one obtains an adequate divisor for calculating average food and nutritional intake as well as the nutritional needs at the adult equivalent level.

(d) Socio-economic items

59. These items are usually common to the different types of household surveys. They include sex (with specific reference to the physiological status of women: pregnant above six months and lactating), age, relationship to head of household, present or absent member, related reporting units if any marital status, educational status, occupation including principal and secondary occupation, industry

employment activity status and status in employment (a more detailed module on employment including security welfare, etc. can also be applied). Data on migration may also be desired covering items such as data of arrival at the present place, duration of stay in the previous place, birthplace, etc. Other data on ethnic group may be useful. Some food consumption surveys also record information on the daily physical activities of residents of the housing unit for the better determination of energy requirements. This approach is often valuable for avoiding underestimation of the nutritional needs of women, especially in rural areas.

III. Concepts and definitions relating to food consumption and food intake

(a) Concept of food expenditure and money value

60. When data are collected through a household budget survey the concept usually applied is that of food acquired during the reference period either from purchases, own production or otherwise obtained, whether or not fully consumed. On the assumption of no significant change in household stocks, consumption is viewed as being equal to current purchases of food from market channels plus home-produced supplies plus food received as gift or pay. In countries where staple foods are purchased in bulk for consumption over a long period, the concept of food acquired is inappropriate if one wants to derive quantities from expenditure data, because of the difficulties encountered in determining the right period of consumption.

61. The most accurate approach used in food consumption surveys is to record simultaneously the food acquired from the market during the reference period and the food actually consumed during that period, as was done in the survey of income, consumption and nutrition in Brazil. In other words, the kinds, quantities, and as far as possible the weights and the value of foods purchased are recorded each day and at the same time. The quantities consumed, as observed in the kitchen, are also recorded by weighing or other approximate methods, with an indication of their origin, for example, purchased, home production, etc. Then the food expenditure data are obtained by applying at the household level a system of prices derived from the purchases as recorded to the quantities bought and actually consumed.

62. The price system is hence derived from the household food purchases. The valuation of consumption of own produce is made on the basis of this price system either for the same household or more frequently for a small geographical area using average recorded prices within this area.

63. This approach, which was used with success in the Brazilian survey already referred to, has the great advantage of imputing a value to food consumption corresponding to what was actually paid by the households plus the monetary equivalent of the home production actually consumed.

64. It is well known that food prices can vary tremendously from one time to another within the same local market and from place to place in different seasons of the year and during the survey period. The approach described above reflects as far as possible the reality of the price variation mechanism and it is preferable to the use of retail prices obtained from neighbouring markets that are often based on price collection surveys conducted parallel to on-going household surveys. For estimates of total food expenditure based on quantities of food actually consumed, valuation in terms of household expenditures and the associated imputations is not only the most accurate approach, but also the most flexible for use in analysing the seasonality of prices and their local variations and the subsequent calculation of food expenditure deflators. In addition, the data on food actually consumed enable the use of other price systems, such as those based on producer prices, depending on specific needs for tabulation and analysis.

65. The collection of information on quantities and/or weight of food purchased as well as the food actually consumed is much preferable to the use of average prices obtained from samples of shops as it is more appropriate to studies of levels of living and the compilation of price elasticities of demand.

66. When the survey is designed to combine the budgetary approach with the measurement of food actually consumed, the best indicator of subsistence consumption as a percentage of total food consumption will be based on the caloric content. In such a case, the results are independent of the price system used.

(b) Concepts of food consumption in terms of quantities, and energy and nutrient content

67. In economic terms, the concept of household consumption refers to the foods consumed by household members during a specified period, at home and outside the home, for example, at restaurants, bars, the work place, school, etc. Usually, food consumption surveys only record quantities consumed at home, and the total food consumption of the household is then derived from these results by using information on meal attendance to construct suitable overall estimates.

68. Food consumption in the home is measured from the actual consumption of food from all sources, as weighed in the kitchen, within a limited period of time. Foods purchased or brought into the kitchen from the garden or farm are normally recorded in terms of gross or "as purchased" weight. If certain data have only been recorded in the form of edible portion, it is necessary to convert them into quantities as purchased.

69. For the economic analysis of survey results, quantities of food consumed are always measured on a gross weight basis.

70. Food consumption expressed in terms of energy and nutrient content derives directly from the food consumption quantities using the same concept. However, in order to apply food composition tables, the data must be converted to net weights (edible portion), using suitable

deductions to allow for inedible matter. Precise data on the amount of inedible portions of food (refuse) must be collected in the kitchen or from a neighbouring area. Food items as purchased minus the refuse give the edible portion of food, which is then transformed into calories and nutrient content. When comparing these intakes of energy and nutrients with recommended allowances, further deductions should be made to allow for losses in cooking and plate and kitchen wastage.

(c) Leftover food

71. This concept is usually concerned with the edible portion of food. Leftovers are foods that are not consumed after preparation. The leftovers that are not consumed by household within the survey period should always be deducted in calculating the amount of food intake. This relates to leftover food that is subsequently given away, fed to animals or allowed to spoil and the food left over on the last survey day. On the other hand, food from preceding meals, encountered on the first day of survey, should be included.

(d) Food intakes

72. Ideally, the concept of food intakes relates to that part of the food consumption which has actually been ingested, that is, food consumption in quantities converted into edible portions minus the leftovers that are not consumed during the reference period. This concept is exclusively used for the nutritional analysis of data on food consumed. Generally, the edible portion and leftovers are expressed in terms of calories and nutrients in order to calculate food intakes. Using the characteristics of individuals, such as sex, age, anthropometric measurements, occupation or physical activity, and the index of presence at meals, the scales of nutritional requirements are calculated. The sum of each of these nutritional requirements at the household or a more aggregated level is then compared with intakes expressed in the same unit and at the same level in order to determine the nutritional adequacy of the diet.

IV. Per capita food consumption food intakes and requirements

73. Estimates of food consumed expressed in terms of quantities and value, divided by the size of the household, give estimates of the apparent per capita food consumption and the per capita food expenditures, respectively. These per capita figures, are used for economic analysis, and can be derived by using as a divisor the consumer units corresponding to the usual residents and calculated as discussed in subsection II above.

74. For nutritional analysis purposes, food consumption quantities divided by the daily dietary units at the eating unit level provide estimates of daily per capita food consumption. From food intakes and requirements, using the same divisor, one can calculate the daily per capita intakes and requirements.

75. These results give a per capita average within the eating unit which is quite different from individual figures. In order to standardize the data for comparative purposes, one can use as divisor the daily dietary units converted into their equivalent adult units. In such a case, the results are expressed in terms of daily per capita amounts for a male adult of 25 years of age with moderate activity.

76. The provision of data on individual food consumption and intakes requires the conduct of a special nutritional survey on individuals within the household as discussed in subsection III above.

V. Household characteristics

77. One major category of data for the analysis of food consumption consists of household characteristics, conditions and activities that are known or believed to have a bearing on food consumption practices and nutritional status. Some household characteristics are determined on the basis of the characteristics of its usual members or a selection of adult members, such as age and sex of head of the household, occupation, employment, education, ethnic group, etc. Other characteristics are derived from survey data, such as information on family size, composition, staple foods, foods food pattern, buying practices, nutritional indicators, family income or total expenditures (in monetary and/or non-monetary terms), expenditures pattern, etc.

78. Broader environmental characteristics can be taken from the sampling frame, such as geographical location, rural and urban location, etc. Additional data on household conditions can also be collected on items such as availability and use of water and sanitation facilities, firewood or other fuel for the kitchen, food storage facilities, food markets, school and health centres, household equipment, etc.

SPECIAL SAMPLING AND OPERATIONAL ISSUES

I. Planning food consumption survey programmes

79. Perhaps the most important decision to be taken at the early planning stage concerns the type of food consumption survey to be undertaken. Some of the considerations which will affect this decision are: the existence or not of an on-going household budget survey in the country concerned; the degree of priority to be given to data on food consumption, taking into account specific needs for such data; the need for special techniques to measure food consumption other data requirements of the country; the plans for data collection and their priorities and phasing in the light of the overall needs of the country; the need to analyse food consumption data in relation to demographic, social, health, economic, agricultural, ethnic and environmental factors.

80. Fearing in mind considerations of cost, objectives and practicality, it may be found that in a country with an on-going household budget survey the choice is not so much between a separate household food

consumption survey and one which forms part of the household budget survey, as between a household food consumption survey to be carried out for only a limited period and one which will be permanently incorporated in the household budget survey carried out continuously or at regular intervals. There are very substantial prima facie advantages to the latter approach, other things remaining equal, since this makes it possible to determine trends in food consumption and to use time-series analysis to determine the factors behind those trends, thus providing tools for building predictive models and for evaluating the effects of changes in policies.

81. However, the choice will rarely be as simple as this. For example, it may be doubted that the information on food consumption collected in the course of household budget survey can be as extensive or as detailed as that collected in a specialized food consumption survey. The household budget survey may already be fully loaded with a variety of questions related to its main economic and social purposes. To place further emphasis on its coverage of food information by additional questions or weighing of foods may tend to overload the survey questionnaire and enumerators, and lead to non-response in addition to increasing the data processing load and affecting the quality of the data.

II. Integration of food consumption surveys with household budget surveys

82. Despite the possible disadvantages, which depend largely on the type of questionnaires used and the length of the reporting period, there are a number of advantages to be gained from a food consumption survey which is carried out in conjunction with a household budget survey. The food consumption data can be analysed in relation to data concerning the remainder of the household budget at the household level, thus providing more detailed and precise information on the relationship than would be possible if it had to be studied through averages for groups of households taken from different surveys and samples. Moreover, the quality of the data on incomes and on total expenditure on food may be better than from a household budget survey. In addition, the collection of data on food actually consumed by source (that is, whether purchased, own-produced, barter, etc.) provides an accurate record of consumption of own produce and the integration of the two types of surveys further enables the detailed analysis of the interrelation between subsistence and monetary consumption, which is of great importance for social and economic studies.

83. It has also been found useful to relate data on food consumption to data on production that may be available from a general household survey. A further advantage is that more funds and other resources may be made available for a household budget survey which also covers food consumption than for a food consumption survey alone.

(a) Integration of items on food consumption in the household survey

84. The integration of a food consumption survey in a general household budget or expenditure survey can be envisioned in various degrees depending upon the urgency of needs of food consumption and nutrition statistics and the stages of economic and statistical development reached by the country.

85. On the one hand, requirements for food consumption data may entail simple adaptation of the household budget survey to yield data on quantities of food commodities acquired or bought in sufficient detail so as to permit their conversion to nutritional equivalents. This has been the procedure adopted in several European countries and in fact the role of household budget surveys in meeting the requirements of food consumption statistics has sometimes been seen in this light. For this purpose there is a need to cover consumption of own produce, which is sometimes omitted in such surveys. Under these conditions the results of such surveys will in fact provide valid averages of quantities of food consumed and their nutrient content in terms of aggregates for broad socio-economic groups and for large areas of the country. However, for countries where there are great variations in food stocks and where their periods of consumption cannot be adequately determined, the results in terms of the distribution of food consumption and nutrition among the various households can be very deceptive.

86. On the other hand, the food consumption survey may be fully integrated with a household budget survey so as to provide detailed data on food actually consumed along with that on food acquired. This has been the approach adopted by several developing countries and the survey already mentioned in Brazil provides ample experience with the inclusion of questions dealing with food consumption and nutrition among the questionnaires canvassed for all households.

87. Since this approach may tend to overload the survey operations and reduce the number of households each enumerator can cover, consideration can be given to obtaining the more detailed information on food consumption by means of an adequate subsample of the main sample used for the household budget survey.

(b) Integration of samples on food consumption with those of the household survey

88. When the food consumption survey is not fully incorporated with the household budget survey, linking of the two surveys can be achieved by an arrangement whereby both share the same sample design, the same geographical coverage and the same set of definitions, classifications, etc. A common sample can be selected for the questions relating to household characteristics and two subsamples from this sample can be chosen, one to provide information on the overall household budgets and the other to provide information for the detailed food consumption survey. In this way data linkage can be achieved at level of group averages between the two surveys, but not at individual household level.

Thus there is no possibility of cross-analysing food consumption and family budget items. An alternative scheme which does have the advantage of data linkage at the individual household level is for households which take part in a household budget survey, or for a subsample of them, also to participate, either simultaneously or subsequently (provided the time difference is not too large) in a food consumption survey. For example, in the household budget and food consumption survey undertaken in Tunisia in 1979-80, a set of three linked surveys was used as follows: a nationwide survey on employment and household characteristics of 60,000 households; a household budget survey covering 6,000 of these households and a food consumption survey using the weighing method of half of the budget sample.

89. Generally speaking, and as a first step towards building their statistical systems, the developing countries have implemented household budget surveys. As these countries developed their planning systems, they have encountered more needs for detailed and comprehensive information on the household and especially for accurate data on food consumption. An integrated approach has been adopted in household surveys undertaken in Madagascar (1962), Ivory Coast (1979), Peru (1971), Brazil (1975) and Tunisia (1975). These surveys have comprised an inventory survey on household budgets and food consumption, along the lines discussed above, and including information on demographic, anthropometric, sociological and employment aspects. These surveys have been carried out nationwide to provide benchmark data and are to be repeated at medium-term intervals.

90. It can be concluded from the above that the integration of food consumption survey with household budget survey serves the broad needs of providing information on the levels and patterns of food consumption and their interrelationships with other socio-economic characteristics of the households. However, from the experience gained in countries which have carried out such surveys, which have incorporated the weighing of food consumed, it has been found necessary to design the field work operations in such a way as to avoid their becoming overloaded.

91. Essentially, it is a question of suitable organization and adequate training of enumerators and the adoption of an effective approach to secure the participation of households in the survey.

(c) Food consumption surveys conducted separately from the household budget surveys

92. Some considerations relating to independent food consumption surveys can briefly be indicated. The integrated household survey of the type discussed above is usually nation-wide, but there may be occasions when a country has a need for a food consumption survey confined to a particular sector of the population. This is the case for example for food consumption surveys carried out for the planning and evaluation of development programmes in certain geographical areas or aimed to cover certain groups of the

population only. Otherwise, food consumption surveys should be carried out as part of a general household survey programme. Advantages often cited of a separate food consumption survey, such as those relating to concentration on one subject, are far outweighed by the advantages and usefulness of an integrated survey programme.

93. In the few developed countries that carry out their food consumption surveys as separate entities (for example, Canada, France, the United Kingdom and the United States of America), efforts have been made to adopt concepts, definitions and classifications which are compatible with those used in other types of surveys so that the interrelationships between food consumption and other factors can be investigated. In the United Kingdom for example, consideration is being given to incorporating the National Food Survey with the Family Expenditure Survey to achieve maximum integration of these data.

94. It is recommended that where food consumption surveys are conducted separately in developing countries, they should include adequate items on household characteristics and that depending on conditions in particular countries, the scope of the surveys should be enlarged to cover at least the items on non-food expenditure. These data provide good background information for different economic levels of the population on which a fair appraisal of consumption patterns can be based.

III. Relationship between food consumption surveys and other enquiries

95. The primary objectives of a food consumption survey are to gain knowledge of the levels, patterns and habits of food consumption of the various population groups in a country. For a fuller understanding of the food consumption behaviour of a population, it is equally important to find out the relationships between food consumption on the one hand and the occupations, incomes, expenditures, education, culture, customs, health and general well-being of the members of the household on the other.

96. In general, it may be desirable to link household food consumption surveys with other kinds of level of living surveys. Information on the size and composition of households, income and expenditure, occupation, etc., is required for studies of the social and economic factors influencing food consumption. In addition, studies concerning the consistency of data collected in a food consumption survey may be carried out more easily if other components of the level of living are covered in the same survey. The levels of food consumption are also related to habits, opinions and beliefs of populations. It is important, therefore, to combine as far as possible quantitative food consumption surveys with surveys of these psychological, social, cultural and anthropological factors. A knowledge of such factors is of primary importance for nutrition programmes such as nutrition education campaigns.

97. In view of the close relationship between food consumption, nutrition and health, it is desirable to co-ordinate, as far as practicable, household food consumption surveys with other specialized surveys including health surveys and surveys of nutritional status. In fact, an integrated survey of all these items may be necessary in connexion with action-oriented programmes aimed at providing remedial measures for improving the health of persons suffering from malnutrition or other nutritional deficiency diseases.

98. Food consumption surveys also have specific relationships with population and agricultural censuses. Knowledge of the population to be represented is important in designing the food consumption surveys. Such information can be provided by population censuses, which supply information on the number of households, their age and sex composition, occupation of members and other relevant data. If the population census has been taken not long before the food consumption survey it may be used as a frame for selecting the area units and households to be included in the survey. In certain developed countries, micro-censuses have been used for this purpose with good results. In these cases, the results of the survey can also be analysed in relation to the population census data.

99. An agricultural census or survey may also supply useful information for designing a food consumption survey and for the analysis of its results. A survey in rural areas may use, for instance, information on the number of agricultural holdings in different size classes or on different types of farms. The agricultural census or survey can also be used in preparing the frame for a subsequent food consumption survey and the data on food consumption can be analysed in relation to characteristics of the holding. Where information on productivity of holdings is available, it can be studied in conjunction with levels of food intakes and nutritional status of farm families to determine the extent to which improved nutrition results in high productivity of household farms and vice versa.

IV. Sampling methods

100. As has been indicated in the previous section, households are generally adopted as sampling units in household food consumption and nutrition surveys and, depending on the scope and type of surveys undertaken, the reporting units comprise budget units and eating units in the case of households budget and food consumption surveys respectively, and individuals in the case of individual dietary surveys. In many cases these other units correspond to households or can be approached through the household.

101. Since an up-to-date and complete list of households is not always available for use as a frame in such surveys, the use of a two-stage sample design greatly reduces the magnitude and cost of compiling such a list. It is also particularly appropriate for food consumption and nutrition surveys, where the method of enumeration entails the use of highly trained interviewers and where the geographical area to be represented by the survey is extensive. The clustering which a two-stage

sample design gives, ensures that interviewers can be fewer in number than would be the case with single-stage random sampling design, and they can be more efficiently deployed so as to spend a greater time with each reporting unit and less time in travelling from one reporting unit to another. Such clustering reduces the efficiency of the sample because of the higher degree of correlation among household units within the same area. This disadvantage may be reduced to some extent by suitable stratification.

102. Where possible, the whole country should be divided into a number of geographical strata which are homogeneous with regard to items that are correlated with food consumption and nutrition, such as population density, topography, agro-ecological features, cropping patterns, etc. Rural areas should be treated separately from urban areas and each may have its own system of geographical stratification.

103. Within each stratum, area units such as villages, enumeration districts, parishes, communes, wards, etc., should be selected as first-stage sampling units.

104. The further clustering of households within selected first-stage units is particularly helpful in food consumption surveys in order to increase the number of households each interviewer can visit in one day, to enable him to operate within a restricted locality, and to facilitate the control of field work operations, thus increasing the overall accuracy of the results.

105. So far, it is been assumed that the food consumption survey will be conducted as an ad hoc survey or will be carried out infrequently, say every five to ten years. However, as discussed above, there are advantages in incorporating a food consumption enquiry in more frequent surveys of consumer expenditure in order to obtain time-series of consumption data. The decision as to whether the sample should be completely replaced each time, partially replaced or completely retained, depends largely on the objectives and frequency of the survey. Since in many cases interest is focused on the measurement of annual changes and yearly average values of household food consumption and expenditure, a rotational sampling scheme with partial replacement of the sample every year can be adopted with great advantage. Although the actual scheme would depend on the extent of correlation found between the consumption data obtained at successive occasions, as well as on practical considerations, a scheme with about 50 per cent matching between two successive years and 25 per cent matching between the first and third year, and so on, is likely to yield useful results in a large number of cases.



UNITED NATIONS
ECONOMIC AND SOCIAL COUNCIL



Distr.
LIMITED

ST/ECA/SM/5
10 September 1981

Original: ENGLISH

ECONOMIC COMMISSION FOR AFRICA
Seminar on Household Surveys
Addis Ababa, 21-30 September 1981

MEASUREMENT PROBLEMS AND TABULATION
PLANS FOR FOOD CONSUMPTION AND NUTRITION SURVEYS

C O N T E N T S

	<u>Paragraph</u>	<u>Page</u>
METHODS OF MEASUREMENT FOR FOOD		
CONSUMPTION TOPICS	1 - 46	1 - 11
POSSIBILITIES FOR TABULATION		
AND ANALYSIS	47 - 70	11 - 16
METHODS OF EVALUATION OF DATA QUALITY	71 - 83	16 - 19

ANNEX I: GUIDE LIST OF FOOD ITEMS TO BE INCLUDED
IN FOOD CONSUMPTION SURVEYS

LC/NAIROBI

METHODS OF MEASUREMENT FOR FOOD CONSUMPTION TOPICS

1. In household food consumption surveys, the method of enumeration to be adopted is determined by the type of respondent and the kind of information to be collected from the survey. Also the choice of a particular method of enumeration is closely related to other aspects of the survey such as the sample design, the reference and reporting period, the plan of field work and data processing.

(a) Some conceptual approaches

(i) Reporting units and respondents

2. The reporting unit which is defined as a group of persons sharing a common food supply may also form a budget unit. In both cases, it may be possible for one member to be appointed to act as an informant on behalf of the whole reporting unit. In certain cases, the budget unit can be divided into two or more subunits. These are composed of people who were wholly or partly independent in the use of their earnings. Although households are often reluctant to use separate booklets for recording expenditure of these subunits, such separate booklets have been found to be useful in improving the reliability of the data. Where the reporting unit coincides with the household or the family, reliance may be placed upon one member, usually the home-maker, to provide the information.

(ii) Food acquired versus food consumed

3. An important aspect of the kind of information required, which will affect the method of enumeration, is whether information is sought on food acquired during the reference period or on food actually consumed during that period. If the aim is to compile averages for groups of reporting units and provided there is no significant change in the overall level of household stocks of food over the time period to which such averages relate, the former should be adequate. If, however, the aim is to obtain data on the food consumed and nutritional intake of individual reporting units, then the latter is to be preferred because the reference period can be shorter.

(iii) Recording at larger stocks

4. In a household food consumption enquiry which forms part of a household budget survey, it is possible to measure both the food acquired and the food consumed provided the operation will not lead to unacceptable levels of non-response and inaccuracy of reporting. It is preferable, in this case to measure the latter directly rather than indirectly, for example, food stocks measured at the beginning of the reference period plus food acquired during the period, minus food stocks measured at the end of the period. This process is laborious and time-consuming and it may therefore lead to non-response or to distortion of respondents' consumption and purchasing behaviour during the reporting period.

(b) Methods of collecting data

5. The three main methods of collecting data on food consumption are interviews, account books, and actual measurement.

(i) Use of interviews

6. In the interview method, the respondent is asked to recollect the quantities and expenditures on food consumed during the reference period. The main disadvantage of this method is that it may be inaccurate because of memory lapses on the part of the respondents. These memory lapses are particularly likely to occur when the reference period is long or in some rural areas where farmers largely feed themselves from their own produce. To facilitate the recall of all foods consumed, the interviewers are usually supplied with a list of foods to use as a prompt list. Visual aids may also be used by the interviewers to assist the informant to recollect the quantity or volume of food consumed. The interview method is the most simple, and response is generally better than with the other methods.

(ii) Use of account books

7. In the accounts book method, the respondent keeps an account of the quantity and the money value of all food items purchased or otherwise obtained during the reporting period. Food stocks are sometimes measured at the beginning and at the end of the reference period. A standard account book or diary is provided to the household by the survey organization. In specialized food consumption surveys, there is usually a day by day record book or diary provided. With this method, the accuracy of the data is less independent on memory. The disadvantages of the technique are that it demands more effort from the respondent and co-operation is therefore likely to be less than with the interview method. The technique may be particularly difficult to apply in some developing countries since it requires a certain level of literacy on the part of the respondent. It is also feasible only where respondents are responsible and willing to co-operate with the survey.

(iii) Use of the weighing method

8. In the weighing method, the food is actually weighed before it is eaten or used for the preparation of a meal or dish. Food wastage and refuse are also weighed in the kitchen and after meals so that net consumption, that is, intakes, can be computed.

9. The method of actual weighing of food is the most accurate of the three methods, because the data are collected by objective procedures which are independent of memory bias. The accuracy of the data will depend on many factors, such as the co-operation of the respondent, the skill of the investigator and the sensitivity of the weighing scales or balances used. With this technique, the respondents are particularly aware of being under observation. They may, therefore, change to some extent their normal eating habits, and their food consumption may assume a pattern somewhat different from their normal one. This method is the most tedious and costly of the three, especially in cases where there are many items to be measured. Moreover, the interviewer cannot be present all the time during the period of the survey, so the weighing method has to be supplemented by information obtained by interview, especially for food eaten between meals. Although there may be a certain degree of non-response due to refusal of the informant to co-operate with this method, experience gained from large-scale integrated surveys (for example, Madagascar: 5,000 households, Tunisia: 3,000, Peru: 8,000, Brazil: 55,000) shows a very low percentage of non-response in surveys using this method. For example, in the Brazilian survey, 2 per cent of the selected households refused to be surveyed, and the range varied from 0.3 per cent in rural areas to 18 per cent in the largest cities (Rio de Janeiro and Sao Paulo).

10. When the eating cycle is adopted as the reporting period, it has been found that at the beginning of the inquiry respondents have a tendency to overestimate their consumption in the case of the interview method and to consume more food than normally in the case of the weighing method. As a result, some surveys, including those using the food account and weighing methods, have excluded from tabulation some initial records obtained during the first 2 or 3 days, on the grounds that they were not representative of the normal household food consumption pattern. For example, in the National Food Survey of the United Kingdom, evidence was found that households purchased greater quantities of food during the first three shopping days. It was therefore decided to omit the first two days' records of data in the final compilation of the results.

11. Where the weighing method is used, it is essential that investigators be adequately trained so that they can secure the co-operation of the respondents in living and eating normally during the period of the survey, without exaggerating their food consumption habits to give a good impression to the investigator. In large-scale food consumption surveys where such training has been effective, the biases resulting from distortion of food habits as mentioned above have generally been found to be negligible. A reporting period of one week, usually adopted in food consumption surveys, is long enough to minimise the effects of shift in consumption habits during the first few days of the surveys.

(c) Other measurements required

(i) Use of local units of measurement

12. In both the interview and the food account techniques, it may be found that not all respondents can express in standard units the quantities of food that are consumed. In such cases the local units will have to be compared with standard units and then converted. The conversion of such local units, which should be undertaken as a supportive activity to an on-going survey, is fairly easy where households use standard containers such as cigarette tins, preserved vegetable tins, etc., but may be somewhat difficult where local containers such as calabashes, local baskets, etc., or where quantities in heaps are commonly used. Under the latter conditions, some surveys have distributed standard containers for use by households for preparing or serving meals. These procedures should be adopted with caution as they may influence the households' food consumption behaviour and may also lead to a certain degree of non-co-operation.

(ii) Measurement of wastage and losses

13. In food consumption surveys using the weighing method, the estimation of food wastage and losses in the final consumption of food is usually incorporated into the survey. Generally, the data concerning food refuse and the edible portion of food are recorded by the weighing method in the kitchen. This latter portion is broken down into effective consumption or intake, edible waste which is thrown away, the part given to pets and other animals, portions given away to other households and the portion of food prepared, which is not consumed during the reference period. The edible waste thrown away or given to animals is generally expressed as a proportion of the total calories in the total household food supply. From the evidence available in developing countries, these amounts have been found to be very low. Results from the Madagascar and Brazil surveys showed an average percentage range of 1 per cent to 3 per cent for this wastage.

14. The factors associated with variations in wastage of the edible portion of food are (urban/rural/metropolitan) income class, family size, period of feast, harvest on food scarcity, storage facilities, for example availability of refrigeration, etc. It may also be useful to analyse the magnitude of wastage of edible portions in terms of major staple foods. For example, the proportion of cooked maize fed to animals has been estimated at 5.6 per cent in Madagascar and 7 per cent in Guatemala. In some other cases, parallel empirical investigations have been undertaken outside surveys to arrive at estimates of food wastage which have then been applied to the results of food consumption surveys.

(iii) Quantification of meals taken outside the home

15. Food consumption surveys generally measure the quantities of food consumed inside the home. However, in order to determine total quantities of food consumed by members of the household, information on meals consumed outside the home by members of the household and those consumed by visitors from the household food supply is normally required. It may also be necessary to calculate at the national level the total human consumption of food, including that consumed in collective living quarters such as hospitals, barracks, camps, etc.

16. A meal attendance questionnaire such as the one used in Brazil, which also is the number of meals taken outside the home (for example, restaurants, canteens, at work or school, other families, etc.), is normally provided for this purpose, and this information is used to arrive at estimates of each household's food consumption. In addition, the information on expenditure on meals taken outside the home is also normally included in such surveys.

17. Another procedure that can be adopted in conjunction with the survey is to obtain information on the type of rations and ingredients of various meals served in various catering establishments for use in determining the quantities and value of meals taken outside the home. This procedure has been adopted successfully in Hungary and tried in the Brazil Survey (1975) but is rather difficult to implement in large-scale food consumption surveys. Where such a procedure is used, it is important to record such meals separately in the case of restaurants, cafes and hotels, hospitals and other medical and educational institutions, as suggested in the System of National Accounts, so as to enable the collation of household expenditure data obtained from food consumption surveys with that in the national accounts and balances.

18. A simpler approach which yields reliable results at an aggregate level is based on transformation of data on the meal attendance record in terms of daily dietary units.

1. Methods of enumeration in individual dietary surveys

19. Individual dietary surveys are undertaken to obtain qualitative and quantitative data on the diet of individuals or special groups, for example, pre-school children, school children, pregnant or lactating women, etc., and also, when combined with household surveys, to determine how food is used or allocated within the household. Various techniques have been developed for investigating individual diets, and the main procedures discussed briefly below consist of (a) the dietary history method, (b) the recall of past food intake and (c) the records of current food intake.

(a) Dietary history method

20. This method is carried out by interviewing individuals or through questionnaires requesting information on what food they usually eat and their approximate amounts. This qualitative type of enquiry is used to obtain information on the usual food consumption of an individual over a recent or past period of time. It reveals major dietary problems, for example, low consumption of nutrients in the diet, and can be used as a basis for subsequent improvement in the food consumption patterns of the individual. The method places a low burden on the respondent but is liable to overestimate intakes if the objective is to obtain quantitative data.

(b) Recall of past food intake

21. This method is used to obtain information of food consumed over the past 24 or 48 hours by an individual. The interviewer should be a trained nutritionist or dietician, or at least familiar with local methods of food preparation. Aids such as food models, measuring cups and spoons or glasses and bowls may be used to help respondents estimate portions consumed. Studies of this method indicate that food consumed may be underestimated due to the greater concentration on main meals than on in-between snacks, which may be of great importance in certain countries. The advantages of the method include low respondent burden, decreased time and expense in interviewing, inclusion of food eaten away from home and less influence on eating pattern. The method is reasonably accurate in obtaining information on average amounts of various food groups consumed by individuals, but not individual intake of each separate food. In some cases, the method cannot be used as a basis for obtaining food consumption or dietary patterns because of its short recall period.

(c) Records of current food intake

22. This method involves accurate weighing of foods by the investigator prior to their consumption by the individuals. The investigator may also have to provide estimated records of the food consumed. The method of weighing can be used by the individuals themselves after explanation by the investigator and can also make use of household measures, for example, cupfuls, spoonfuls, counts, etc., instead of actual weighing. The weighing of food must be very accurate and care must be taken to weigh only that food which is to be eaten. Also, all amounts, including small portions that may be of considerable nutrient value, must be weighed in order to give an accurate picture of food consumed.

23. The advantages of this method are that it results in a very high degree of accuracy when carried out correctly. However, it is tedious and likely to affect the eating pattern of those investigated. Responsiveness and co-operation are required from the individuals under investigation. It is cumbersome to apply, especially in communities whose individuals eat from the same pot and it can be subject to error from inaccurate weighing or dishonesty on the part of the individual. Further inaccuracies and errors occur when household measures are used instead of standard weighing measures. The method is also costly, and since only a few individuals can be covered at a time, sample sizes are restricted, which may especially affect estimates for the critical age groups of the population.

24. Another consideration relates to individual versus household consumption in food consumption surveys. Individual dietary surveys provide data on dietary intakes of individuals of given age and sex which cannot be obtained from a household food consumption survey. They provide data that may reveal wide variations in intakes of individuals within the same household, and these intakes may not be in proportion to recommended intakes, especially for vulnerable groups comprising children, lactating and pregnant women and the elderly. Differences in nutritional requirements, food preferences, family and community customs, daily routines and activities of family members affect the dietary intakes of individuals in the households. Such data are useful for nutrition programmes aimed at at-risk individuals, and for intervention programmes requiring knowledge of the distribution of food within the family.

25. Comparisons of average recommendations for nutrient intake with averages for household food consumption are based on the assumption that family distributions of nutrients are in proportion to recommendations. Also critical is the allocation on a per person basis of the nutrient content of the household food supply for each nutrient independently, regardless of its source. It may happen that some foods are largely consumed by certain members of the household and while the rest consume them very rarely. Collection of information on both individual food intake and household food intake thus provides clearer insights into how food is consumed and allocated within households.

2. Methods of measurement in nutritional status surveys (anthropometry)

26. Cross-sectional anthropometric data collected on a large-scale basis give a good and quickly obtained picture of the nutritional status of individuals in a population. For children, reliance should be placed on weight for height as an indication of the present state of nutrition and on height for age as an indicator of past nutrition. 1/ Height for age is a particularly useful and valid indicator for the measurement of the nutritional status of children under one year of age.

27. The methods used are relatively simple and can easily be adopted as part of an on-going household survey. 2/ Precautions necessary include the suitable training of field personnel; adjustment of scales before each measuring cycle, checking for observer error and the rotation of field workers among groups of subjects to be measured.

(a) Age

28. Age data are critical in this field. Various precautions and procedures must be observed to obtain accurate age data. These are discussed in other portions of this Handbook.

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- 1/ The presentation and use of height and weight data for comparing the nutritional status of groups of children under the age of 10 years.
 - 2/ For details, see Measurement of Nutrition Impact (Geneva, WHO, 1979).

(b) Weight

29. The types of measuring instruments are the following:

- For children below 5 years: a SALTER spring balance (Model 233 PBW) with a scale measuring up to a maximum of 25 kgs. in increments of 100 grams is recommended. With this type of balance, the child hangs in a specially designed "bag". This model is sturdy, compact and can easily be transported;

- For children 5 through 9 years and adults: a bathroom scale on which the person stands. The apparatus usually reads to a maximum of 100 kgs. in increments of 100 grams. In both these age groups the readings are taken to the nearest 100 grams.

30. For older children 2 years and above and adults, a vertical measuring rod can be employed. For infants and pre-school children below 2 years, recumbent length (crown-heel length) has to be measured. This is usually done with a wooden length-board or infotometer.

31. For international comparability of the data, indicators on weight for age, weight for height and height for age are compared with those obtained from an international reference population. The Boston Standard has generally been accepted as a suitable yardsticks for comparison with local measurements. For national use and in countries where local references are not available, it is useful to define suitable targets or yardsticks for the local population, based on the weights and height of healthy and well-nourished children in the same country, for use in interpreting the results.

3. Time coverage of the survey

32. There are aspects of time coverage to be considered in a food consumption survey, namely: (a) the period to be represented by the survey and for which results will be presented, usually called the period of the survey; (b) the period of time to which the records provided by an individual household relate, usually called the reference period; and (c) the period over which a reporting unit is actually engaged in providing the information required for the survey, usually called the reporting period.

(a) Period of the survey

33. The economic and nutritional concerns of most household food consumption surveys make it desirable that the overall period of the survey should cover at least a 12-month period. Surveys which represent a period shorter than a year may give results which are not typical of the year as a whole. Ideally, the survey should be carried out continuously throughout the year and separate results for each season should be tabulated to show the extent of seasonal variation.

34. In such a case the choice is between completely rotated samples and a survey with repeated visits to households throughout the year or some combination of the two approaches.

35. In the case of rotating samples, the year is normally divided into a number of shorter periods, and in each period or cycle only a part of the total sample is surveyed, usually with each household having reference and enumeration periods of shorter duration. More generally, the year can be split into short periods corresponding to the enumeration period and the same number of households surveyed in each short period. In this case, it is essential to divide the universe into homogeneous ecological zones in which subsamples of households are selected for random distribution throughout the different periods of the year. The rotation of the sample should also be done at random on a geographical basis within each operational area. Some examples of country practices in recent food consumption surveys are the division of the year into 24 periods of two weeks' duration in Sweden, 12 periods of one month in Canada, the German Democratic Republic and Greece, and eight periods of six weeks' duration in France.

36. Alternatively, use can be made of repeated samples (the panel method) whereby the panel consists of a sample of households which is normally fixed, with all households participating in the survey in each cycle or season, subject to some rotation after participation for a certain length of time. For example, panels were revisited two or three times in household budget food consumption surveys adopting this approach in Burundi, Togo, Chad and Colombia.

37. There are various trade-offs in terms of the value of data furnished, possible co-operation of households, non-response, sample size, cost, etc., between a food consumption survey using completely rotated samples and a survey adopting repeated samples.

38. The repeated sample approach is generally used to minimize memory lapses on expenditure items and to obtain precise measures of trends or variations in food consumption and nutritional status of individual households throughout the year. Attempts to overcome by repeated visits, the disadvantages of recall and of partial knowledge of the food consumption level of particular households resulting from rotated samples are usually at the expense of reduction in sample size, either because of the cost factor or some fall-off in response, or both.

39. With the use of completely rotated samples, it is not possible to derive meaningful annual figures of the percentage of households using a particular item of food or group of foods by combining seasonal percentages because different households are surveyed in different seasons. With the panel method, on the other hand, meaningful percentages can be computed. Moreover, since estimates of the annual income and consumption of individual households can be computed, valid frequency distributions of households by levels of food intake can also be provided. Such data are particularly useful in studies undertaken on income distribution and the estimation of numbers undernourished.

40. The panel method may introduce some bias in the results obtained and also lead to non-response as compared to methods using completely rotated samples. However, since discontinuity in time-series must also be avoided, partial replacement, say after six months, is often used. A more elaborate procedure was adopted in the Household Consumption Expenditure Survey of four cities in Colombia in 1967/68. In order to have trimestrial subsamples to facilitate the collection of data and to study seasonal variation in the consumption of district products, the sample of 2,103 was divided into eight groups, of which the first was surveyed in all trimesters, three were interviewed twice but in different trimesters and four interviewed only one each in different trimesters.

(b) Reference period

41. In an integrated household budget and food consumption survey, where food actually consumed is recorded, the reference period for which data is collected should be long enough to cover a complete "eating cycle", which generally might be as short as a week. As far as food expenditure is concerned, a "buying cycle" of one month is usually adopted. This usually corresponds to the periodicity of wage payments, especially in the urban areas. The period may even be longer than a month if the households possess the facilities for long-term storage of food and have to buy and hold substantial stocks. For other expenditure items, the reference period depends on the frequency of purchase in relation to the memory of informants in recalling them. Thus in integrated surveys various reference periods are often adopted for various items of expenditure and linked to the period fixed for the food record part of the survey.

(c) Periods of enumeration

42. The methods and periods adopted for collecting data will vary depending on particular items and the ability of households to recollect them. In the case of food consumption surveys a continuous recording period is usually adopted, using the weighing method, with daily visits of enumerators to the households. In this case the enumeration period coincides with the reference period. For items of food expenditure of food acquired, an enumeration period of one month is usually adopted, but with recording periods every day, every two or three days, or once a week, etc., depending on the types of information collected and conditions prevailing in a particular area. For example, in rural areas, consumption of own produce may have to be recorded at least daily or at intervals of not less than once a week. This requirement is often overlooked by survey planners. On the other hand, items of food expenditure in the rural areas may be recorded only once a week, while in the urban areas they should preferably be recorded every day, or at least twice or three times per week. Enumerators may also be instructed to return to households outside the period of their continuous investigation to ask retrospective questions on expenditures during the intervening period. A wide range of procedures has been used in different surveys and countries need to experiment to determine the most suitable reference and enumeration periods for food and non-food items included in their surveys.

43. In the 1975 Tunisia Household Budget and Food Consumption Survey, the weighing of food was carried out over a week's period with daily visits by enumerators to the household. Records on expenditure on food were also taken covering a one week period, together with some other items of consumption expenditure such as petrol, hairdresser expenses and tobacco. The above items were again recorded at 10-day intervals for expenses incurred during the week, including consumption of own produce, for comparison with daily records. Other general information on household expenditure on items such as dwellings, durables, transport and travel relating to two, three or eleven preceding months, as well as data on employment and income, were recorded during the periods of enumerators' visits to households.

44. Another example summarizes the procedure adopted in a household budget and food consumption survey conducted in Louga-Zinguere in Senegal in 1978. The food consumption part of the survey was carried out over a period of five days using weighing methods. The household budget survey was undertaken by interviewing families on their income and by recall on their expenditures for groups of expenditure items, during 10 days with daily recording of expenditure, and during 20 days with two recall interviews relating to the preceding 10 days.

45. On the basis of this scheme, six households were covered in both the budget and food consumption surveys by one enumerator in one month, as follows:

$C + B_j \cdot B_j$	BI	BI	First household
$B_j \cdot C + B_j$	BI	BI	Second household
BI	$C + B_j \cdot B_j$	BI	Third household
BI	$B_j \cdot C + B_j$	BI	Fourth household
BI	BI	$C + B_j \cdot B_j$	Fifth household
BI	BI	$B_j \cdot C + B_j$	Sixth household

C = recording of food consumption by weighing

B_j = recording of daily total expenditure

BI = recording by recall method over the preceding 10 days.

4. Some operational considerations

46. The above discussion shows that the collection of data on food consumption and household budgets requires the careful planning of field operations. It further shows that for these types of surveys the enumerators must often work in restricted localities or villages in order to carry out daily visits to selected households. Only a few of these households (about four as a maximum, half of which are normally investigated for food consumption) can be covered by each enumerator in one day. In sparsely populated areas, the number of households each enumerator can cover in one day is severely limited due to the time required for travel. As a result household budget and food consumption surveys of this nature undertaken in developing countries have covered limited samples in the case of repeated samples. However, sample sizes have been fairly large in surveys adopting rotated samples (Brazil 55,000, Madagascar 5,073, Peru 7,933, Tunisia 4,962). These samples generally worked out at sampling fractions ranging from

1/200 to 1/380 and at estimated costs ranging from \$US80-120 per household. Experience in the integrated surveys noted above also shows that in general the enumeration periods cover seven days plus two days for travelling and rest. This amounts to about 40 working periods per enumerator per year. Empirical study is required to determine the optimum reference and enumeration periods, frequency of enumerators' visits to households and workloads for enumerators in integrated household survey programmes in developing countries.

POSSIBILITIES FOR TABULATION AND ANALYSIS

47. The analysis and tabulation of the data obtained from a food consumption survey depend in the first instance on national requirements and capabilities. Each country must decide on the analyses, tabulation and studies which are necessary to satisfy its own requirements. Over and above such internal needs, however, there is mutual benefit to be gained by comparing the survey findings in one's own country with those in others. Common problems are thereby identified or highlighted and ideas as to their solution may be shared. In addition, work at the international level for encouraging, co-ordinating and evaluating world programmes for improvements in food production and distribution is facilitated if world-wide data on food consumption and requirements are available. Such work requires common standards of data presentation and a common channel through which the survey results can be disseminated. However, such international needs for data should not be achieved at the expense of national requirements.

1. Nutritional evaluation

48. The derivation of estimates of energy and nutrient intake from food consumption data and their comparison with scales of nutritional requirements can take up an appreciable part of the data processing capacity available to a food consumption survey, and it imposes a number of constraints in terms of data elaboration.

49. The first essential relates to data on food quantities. For economic analysis, it is essential that food consumption be expressed in terms of food as purchased. In order to ensure uniformity in the results, it may be necessary to convert the food items to a common state, for example, data recorded in terms of edible portions or of registered food preparations which have to be broken down into various ingredients as purchased.

(a) Food composition tables

50. The final list of individual food items must be sufficiently detailed for them to be classified according to a system which is sensible for both nutritionists and economists. To determine the nutritional content of food, it is also necessary to provide food composition tables based on whatever description and classification of food is used. ^{1/} These tables give the nutritional composition

^{1/} Food composition tables available at international level are: Food composition table for use in East Asia, FAO/United States Department of Health, Education and Welfare, 1972; food composition tables for use in Africa, FAO/United States Department of Health, Education and Welfare, 1968; food composition tables for use in Latin America, INCAP/ICNND, 1961; and food composition tables for international use, FAO, Rome, 1954.

of food in terms of 100 grams of edible-portion. Therefore, as far as possible, various factors derived from the survey are used to convert food consumption into edible portion and to calculate from the food composition tables the energy and nutrient content of that consumption. By deducting from the previous results the leftovers recorded during the survey and then transforming these results into nutritional values, the energy and nutrient intake of food consumed can be established.

(b) Scale of nutritional requirements and allowances

51. From the individual data on age, sex, height and body weight and occupation, and using available scales of nutritional requirements, the individual requirements of each person in the household who took part in the survey can be calculated. National scales of nutritional requirements are sometimes available. However, the recommendations prepared by FAO and WHO are being increasingly used. These scales of requirements for energy and protein are regularly revised in order to take into consideration new developments in the state of knowledge in this field. Besides the recommendations on nutritional allowances, other scales of minimum nutritional requirements are currently under consideration for use in identifying groups of the population at great risk of malnutrition.

52. The tendency in the near future may be to analyse the results of food consumption surveys in terms of two scales based on nutritional recommendations and minimum requirements. The first scale will be used to determine the level of well-being of the population and the second scale will be used as an indicator of severe deprivation. Experimental work on the use of these two standards has been undertaken on the results of food consumption surveys conducted in Brazil and Tunisia.

(c) Scaling systems and nutrition units

53. Mention has already been made of the use of data on the median weight for median height by age and sex for the estimation of average energy requirements per day, by age and sex of the population. These figures are used to prepare scales of nutrition units, taking a male of 25 years of age with moderate activity as a standard.

54. For instance, in the Brazilian survey the scaling system based on average energy requirements per day by age and sex and according to the median weight for median height gave the following figures:

Age (years)	Coefficients	Age (years)	Coefficients	
			Males	Females
0 - 1	0.30	14	0.85	0.80
1	0.39	15	0.90	0.80
2	0.43	16	0.95	0.80
3	0.48	17	0.97	0.80
4	0.52	18	0.99	0.80
5	0.54	19	0.99	0.80
6	0.57	20 - 29	1.00	0.80

Age (years)	Coefficients	Age (years)	Coefficients	
			Males	Females
7	0.60	30 - 49	1.00	0.80
8	0.63	50 - 59	1.00	0.80
9	0.67	60 - 69	0.90	0.70
10	0.70	70 - 79	0.90	0.70
11	0.74	Over 79	0.90	0.70
12	0.76			
13	0.78			

55. For specific purposes such as comparing the distribution of nutrients, that is, protein, vitamins and minerals, among households; other scaling systems can also be established. However, such scales are not as general as scales constructed on the basis of energy requirements.

(d) Allowance for meals taken outside the home

56. It is generally impracticable to collect data on quantities of food eaten outside the home, that is, food not provided from the common household food supply. Therefore, the data on nutrient intakes from a survey are based only on quantities of food eaten from the common household food supply whereas the scales of nutritional requirements are with respect to total daily needs. As a result, it is necessary to make some adjustments to requirements so that they are comparable with the intakes recorded. On the basis of the number and types of meals obtained inside and outside the home by each member of the eating unit, and using a meal weighing system derived from the food intake results, one can determine the individual daily index of attendance at home meals. The daily requirements, weighed by this index, give the daily adjusted requirements which, after summing up at the eating unit level, can then be compared with information on intake.

chapter.

(e) Uses and interpretation of results

57. It follows from the foregoing discussion that the comparison of the estimates of nutrient intake with estimates of requirements or some other standard are of a very rudimentary nature, and caution must be exercised in the interpretation of the results of such comparisons, especially when the differences are of relatively minor magnitude, since they are subject to varying degrees of uncertainty.

58. National average figures may conceal vital differences among different sections of the population arising both from unevenness in the distribution of available supplies as well as differences in requirements. Although further analysis of the survey data will enable intake to be compared with requirements separately in each population group, the value of the between-group comparisons of the resulting ratios will depend very much on the extent to which they have been affected by sampling and other errors including those due to the use of estimation. At best, they will

pinpoint those population groups which might need special attention regarding food and nutrition, and to which further full-scale individual dietary surveys combined with physiological and clinical measurements might be directed so as to assess their true nutritional status and thus form a basis for selective food and nutrition policies.

59. The whole process of using the data obtained from food consumption surveys to provide estimates of nutrient intake in relation to requirements or other standards is thus seen to be beset with problems for which no simple and precise solutions are available. Assumptions and approximations have to be introduced. Some of the problems are all the more acute if the food consumption survey is incorporated in and becomes part of a household budget survey. To this extent they reinforce the argument in favour of linking food consumption surveys to a budget survey in preference to incorporating them into the normal budget survey procedure.

2. Data processing requirements

60. The use of electronic computers is now widespread for processing survey data and this provides opportunities following field checking for logical checks and other correction procedures to be carried out which formerly would have fallen to editing and coding staff or would not have been done at all. It should be borne in mind that, in a food consumption survey, each household's record provides a long string of data, that a large number of household records is usually obtained during the course of a year, and that this may give rise to problems of access to the data which have been read into the computer and of its linkage to files of food composition tables of nutrient requirements or recommended intakes, and similar reference material. It is therefore important at the outset to consider a system which will have the capacity to perform all the tasks that will be required, and it be prudent to ensure that sufficient additional capacity is available to allow for some future expansion.

61. The returns on survey costs, including costs of subsequent storage are the benefit resulting from maximization of data use. This means rapid and constant access to information without additional cost for the reprocessing of derived variables. Moreover, data have different uses in the short term and in the long term, that is, in time series. This should be taken into account in the preparation of a system directed to the optimization of data use.

62. Food consumption surveys with a variety of objectives should be subject to integrated analysis using a hierarchy of reporting units such as household, budget unit, eating unit, individuals, for various items of information such as daily food consumption per meal and per product, etc. After the release of the initial tabulations and report of survey results, the data base should always be kept in a form suitable for continuing access and analysis of the data. Such a data base, when organized in the form of a structured collection of record files, provides an integrated data processing and calculating system for use in analysis of the data, purposes of interest to users. Such a system increases the possibilities of in-depth analytical studies using the survey results, such as a study of household economic and nutritional profiles or the quantification of malnutrition.

3. Possibilities for tabulation of data on food consumption and nutrition

63. Although the tabulation of the data and their presentation in summary form are among the last operational phases of a survey, a draft tabulation programme should be prepared at the questionnaire design stage so as to ensure that the data to be collected will be in conformity with data requirements. In addition, an expanded tabulation plan should be prepared at an early stage taking into consideration the quality of data, the details of breakdowns that can be provided within acceptable limits of accuracy, the capacities for further calculations and the priority needs of the different users. A list of illustrative tabulations divided into minimum and extended tabulation plans is given below. This list is illustrative and should not be taken as representing a formal recommendation.

(a) A minimum tabulation plan

64. The population groups for which consumption patterns should be shown may be derived from the following:

- (i) All households
- (ii) Urban/rural
- (iii) Farm/non-farm
- (iv) Socio-economic groups
- (v) Households by size

65. Breakdowns according to urban/rural, farm/non-farm, socio-economic groups and household size should be made on the basis of local conditions. When information on income or total living expenditure is available, the data can be classified either on a per capita basis or on a per household basis. Per capita estimates provide a better indicator of the economic status of households, but if used for making comparisons between groups, it should be remembered that they mask differences, due to differences in age, sex and other characteristics of persons in the different groups. The classification according to household size can usefully incorporate some discrimination among families of different composition.

66. The statistics shown for each population group should present the food consumption pattern of the group in terms of the following:

- (a) Average quantities of different foods eaten at home (and away from home if such information is available), with separate averages, where important, for food purchased and for home-produced food and food otherwise obtained per person (or household) per week (or otherwise specified time period);
- (b) Average money value of different foods (and the total for all foods) used at home per person (or per household) per week (or other time period) with separate averages, where important, for food purchased and for food otherwise obtained (including home-produced food). Expenditure on food purchased and eaten away from home should also be shown;
- (c) Average energy value and nutrient content of food used per person. The contribution of each food group to the total of each nutrient should also be shown.

67. The descriptive information for households in each population group should include:

- (a) The number of responding households in the sample;
- (b) The average household size;
- (c) The average income or other measure of economic status used for classifying the household.
- (b) Expanded tabulation plan

68. The first three of the four types of data specified under the minimum tabulation plan may warrant further detailed analysis and tabulations. The expanded programme here described should therefore be considered in connexion with more elaborate surveys, to supply information on the levels and patterns of food consumption and for other analytical purposes such as demand analysis, and for use in conjunction with the results of other surveys on levels of living and basic needs.

69. The statistics to be shown for each population group might be expanded, in comparison with those shown for the minimum plan to include:

- (a) Comparison of the nutritive value of the diet with requirements or recommended allowances;
- (b) Distributions of households according to levels of nutrient intake or according to intake relative to requirements or allowances;
- (c) Percentage of households in each population group using (or purchasing) specified foods;
- (d) Distributions of households by amount of food expenditure;
- (e) Average prices paid for different foods by different population groups;
- (f) Various derived statistics such as demand parameters, indices of food prices, food expenditure and food quantities; costs per calorie from the various foods.

70. Further tabulations in the expanded plan should also present material concerning the quality of the data which is being presented, as discussed in the next section, below.

METHODS OF EVALUATION OF DATA QUALITY

71. The previous sections of this chapter discussed some general requirements for reducing or controlling the magnitude of sampling and non-sampling errors and biases in food consumption surveys. The present section presents some of the methods that can be used in evaluating the quality of survey results. As the experience in food consumption surveys undertaken in developing countries is still very limited, reference will also be made to a few procedures that have been adopted in developed countries.

1. Calculation of sampling errors

72. The extended tabulation plan discussed above should include provision for calculation and presenting sampling errors relative to all the total average in the tabulations prepared on the results of food consumption and nutrition surveys. Since such computations may present a formidable task for countries without adequate data processing facilities, the minimum requirement is to present such errors for total energy and protein intakes, for totals of staple foods consumed and for the major groups of items on expenditure. The minimum tabulation plan presented in section D could serve as a useful basis for selecting a short list of items for which to calculate sampling errors.

2. Treatment of non-response

73. The magnitude of overall non-response due to all causes (for example, outright refusals, untraceable families, families with incomplete records, etc.) is very small in food consumption surveys conducted in developing countries. Survey results available show that non-response hardly reaches 10 per cent in these countries. (Examples are Brazil, 2 per cent, Tunisia, 5 per cent, Trinidad and Tobago, 7 per cent.) Analysis of these results shows that the great proportion of the overall non-response is usually due to families that could not be contacted due to changes in their address, prolonged absence from dwellings and unavailability for participation in the survey for social or cultural reasons.

74. On the other hand, in the developed countries the degree of non-response in food consumption surveys is usually high and may reach levels around 50 per cent. (Examples available range from 14 per cent in Cyprus to 50 per cent in the United Kingdom.) Despite the generally good experience with non-response in developing countries, it is essential that survey planning take every precaution to ensure that any problems which arise can be properly dealt with.

75. Most food consumption surveys conducted in both developing and developed countries have emphasized certain procedures for reducing non-response and other related non-sampling errors and potential sources of bias encountered at various stages of these surveys. These have comprised measures such as the suitable planning of field operations and timetables, the arranging of publicity campaigns to promote the co-operation of respondents in the survey, planning of field operations including the proper selection, training and motivation of interviewers, strict checking and editing of completed schedules, etc.

3. Use of internal consistency checks

76. Several internal consistency checks have sometimes been applied to the results of food consumption surveys at the data processing stages, and a few of these will be mentioned here, without attempting to present a comprehensive picture.

77. The average per capita consumption of the staple foods which constitute the bulk of the household diet in developing countries can be used as an indicator of the accuracy of the results of food consumption surveys. Since it could hardly be expected that an adult would consume more than one kilogram of cereals a day, any household records showing per capita consumption of staple foods for adults

in excess of one kilogram per day are likely to be erroneous. Similarly, records of per capita consumption of energy by adults much in excess of 5,000 calories per day are likely to be suspect, and the error may be traced to figures on quantities consumed or to the omission of certain household members, guests or visitors who may have participated in meals served on that day.

78. Another method of evaluating the quality of food consumption survey results is based on the computation of scatter diagrams of households' per capita energy intakes against requirements, which can be encircled by an ellipse determined in such a way that the probability of any household falling outside its boundaries is less than 5 per cent. All households whose positions fall outside this curve can then be re-examined on the basis of the original records for purposes of finding the error and making suitable corrections in the original data. Usually, such errors are found to have resulted from the quantity or type of commodities consumed, the estimation of wastage, and the conversion factors used in translating quantities into their energy content.

79. A similar scatter diagram can also be prepared by computer on relationships between weight and height of children in the case of anthropometric data. Again, the units falling outside a predetermined threshold can be retrieved for fuller evaluation and adjustment.

80. One way in which the accuracy of the quantity and expenditure records has been assessed is by dividing expenditure data of certain important food commodities by their quantities and comparing the results with the known unit prices of these commodities at the time of the survey. Other internal consistency checks which have been used in the process of collecting records on household budgets and food consumption consist of the control of expenditure data through comparison with figures of disposable or other related forms of family income.

4. Use of external consistency checks

81. The comparison of survey results with other statistics on quantities and expenditure on food may also serve as an excellent means of evaluating the quality of data obtained from food consumption surveys.

82. Food consumption survey results at the aggregate level can be compared with the results of food balance sheets. The latter measure per capita food supply or apparent consumption as obtained from the total of foodstuffs produced in the country plus imports, after making adjustments to allow for changes in stock, subtracting quantities put to non-food uses (including use for seed and feed and manufacture) and losses to arrive at domestic food supplies in quantities and nutrient value, which are then divided by estimates of the total population. Such comparisons should ensure that the quantities entering into the above aggregates are reliable. However, it is necessary to check on the commodity coverage, especially the coverage of home-produced food that may not always be covered in food balance sheets. Other possibilities concern comparison of two estimates at the same level, for example, the retail level. In any case, allowance must be made for food consumed at institutions and similar catering establishments.

83. Data on food expenditure obtained from food consumption surveys can also be compared with estimates of private expenditure on food available in national accounts and balances. Care should be taken to ensure that the commodity coverage is compatible, allowance is made for food taken at restaurants or other catering institutions and that valuation of items is based on farm-gate or producer prices. Where countries conduct separate household expenditure surveys, the results of their aggregate food expenditures can be compared with similar data obtained from a food consumption survey. The former data should be carefully reviewed for population and commodity coverage, especially the coverage of own-produced food. This is because consumer expenditure surveys are often restricted in these respects, since their primary purpose may be to obtain weights for consumer or retail price indices.

GUIDE LIST OF FOOD ITEMS TO BE INCLUDED IN FOOD CONSUMPTION SURVEYS

I. FOOD FROM THE COMMON FOOD SUPPLY

1. Cereals and cereal products

1.1 Grains as whole grain, meal, flour
(specify where important: wheat, rice, rye, barley, oats, maize (corn), millets, sorghums, etc.)

1.2 Pastes: macaroni, spaghetti, etc.

1.3 Commercially baked goods
(specify where important: bread and other baked goods)

1.4 Other cereals and cereal products
(specify where important)

2. Starches and starchy roots

2.1 Potatoes
(specify form where important: fresh (new, old), canned, dehydrated, flour, etc.)

2.2 Sweet potatoes
(specify form where important: fresh, flour, etc.)

2.3 Cassava
(specify form where important: fresh, meal, flour, etc.)

2.4 Other starchy roots
(specify where important)

2.5 Starches (pure, dry)
(specify where important: wheat, maize, rice, potato, cassava starches, sago, etc.)

3. Sugars and sweets

3.1 Sugars
(specify where important: crude, refined, cane, beet, palm, coconut, maple, etc.)

3.2 Syrups and molasses
(specify where important: molasses of cane sugar, of beet sugar, cane juice, cane, maple, corn, carob, grape, date syrups, etc.)

3.3 Honey
(including honey in the comb, etc.)

3.4 Others
(specify where important: jams, marmalades, candy)

4. Pulses (dry)

4.1 Beans
(specify where important: broad beans, kidney beans, lima beans, mung beans, etc.)

4.2 Peas
(specify where important: dry peas, lentils, chick peas, etc.)

4.3 Soybeans and soybean products
(specify where important: whole soybeans, soy sauce, soybean curd, soybean paste, soybean milk, soybean flour, etc.)

5. Nuts

5.1 Groundnuts
(specify form where important: in shell, shelled, roasted, salted, in butter, etc.)

5.2 Coconuts
(specify form where important: mature nuts, immature nuts, coconut milk, shredded coconut, etc.)

5.3 Other three nuts
(specify where important: almonds, pistachios, cashew nuts, walnuts, pecan nuts, wild or unspecified, etc.)

6. Seeds

(specify where important: squash, watermelon, sunflower, sesame seeds, etc.)

7. Vegetables

(unless otherwise specified, fresh forms will be assumed. Where important, canned, frozen, powdered, dried - except dry pulses -, strained, chopped, pickled, etc., should be specified).

7.1 Roots, bulbs and tubers
(specify where important: beets, carrots, kohlrabi, leeks, mature onions, okra, parsnips, radishes, horse radishes, salsify, scorzonera, turnips, ratabaga, etc.)

- 7.2 Leafy vegetables
(specify where important: bean sprouts, beet greens, brussels sprouts, cabbage, cassava leaves, celery, chicory and endive, kale, lettuce, mustard greens, okra leaves, parsley, spinach, onion leaves, other leafy vegetables).
- 7.3 Tomatoes
(specify where important: fresh, canned, etc.)
- 7.4 Other vegetables, edible flowers, stems
(specify where important: artichokes, asparagus, broccoli, cauliflower, celeriac, chayots, cucumbers, eggplant, sweet corn, pumpkins, squashes, gourds, red or green peppers (fresh), beans and peas (fresh), etc.)

8. Fruit

(unless otherwise specified, fresh forms will be assumed. When important, canned, frozen, strained, chopped, etc., should be specified).

8.1 Bananas and plantains

- 8.2 Citrus fruit
(specify where important: grapefruit, lemons, limes, oranges, etc.)

- 8.3 Fat-rich fruit
(specify: olives, avocados, etc.)

- 8.4 Other fresh fruit
(specify where important: apples, apricots, berries, breadfruit, cherries, dates, figs, grapes, guavas, jackfruit, mangoes, melons, papayas, passionfruit, peaches, pears, persimmons, pineapples, plums, pomegranates, quinces, sapodilla, sopote, soursop, etc.)

- 8.5 Dried fruit
(specify: dates, figs, raisins, etc.)

9. Meat and meat products, poultry and insects

- 9.1 Fresh and frozen meat
(specify where important: beef, veal, pork, mutton and lamb, goat, buffalo, camel, horse, rabbit, venison, whale and other domestic or wild species)

- 9.2 Offal
(specify where important: animal and type, that is, liver, kidney, brain, heart, sweetbread, etc.)

- 9.3 Meat products
(specify where important: bacon, ham, dried beef, dried pork, canned beef, canned pork, sausages, according to main types, etc.)
- 9.4 Poultry and wild birds
(specify where important: chickens, ducks, geese, pigeons, turkeys, etc.)
- 9.5 Insects
(specify where important: distinguishing at least between adult insects and larvae)

10. Eggs

(Assumed fresh, unless specified: dried, frozen, yolks, whites; specify where important: hen, duck, goose, turtle eggs, etc.)

11. Fish and shellfish

- 11.1 Fish, fresh
(specify where important, making a distinction at least between fat fish (salmon, trout, herrings, mackerel, etc.) and low-fat types (cod, haddock, etc.))
- 11.2 Shellfish fresh
(specify where important: lobsters, crawfish, crabs, shrimps, oysters, clams, mussels, etc.)
- 11.3 Fish, salted, smoked or dried
(specify where important: fat-rich types and fat-poor types)
- 11.4 Fish, canned
(specify where important: in oil, not in oil, fat-rich types, fat-poor types)
- 11.5 Shellfish, canned
(specify where important: lobsters, crawfish, crabs, shrimps, oysters, clams, mussels, etc.)
- 11.6 Other aquatic animals (alligators, turtles, frogs, etc.)

12. Milk and dairy products (excluding butter)

- 12.1 Milk, liquid, whole
(specify where important: cow, goat, sheep, buffalo, camel, etc.)
- 12.2 Milk, liquid, skim or buttermilk, partly skimmed milk
- 12.3 Cream
(where possible specify fat content)

- 12.4 Cheese
(specify important varieties: hard, soft, semi-soft, from whole milk, partly skimmed milk, skim milk; whey cheeses, hard, soft, semi-soft, etc.)
- 12.5 Milk, processed
(specify where important: evaporated, whole, unsweetened milk; condensed, whole, sweetened milk; condensed, skim, sweetened milk; dried whole milk; dried skim milk; yoghurt and other fermented milk, etc.)
- 12.6 Yoghurt, other fermented milk and fresh milk product
- 12.7 Ice cream
- 13. Oils and fats
 - 13.1 Vegetable oils and fats
(specify where important: oils, hardened shortening, etc.)
 - 13.2 Animal fats
(specify: butter, ghee, lard, suet, tallow, etc.)
 - 13.3 Marine oils
(specify)
 - 13.4 Mixed products of vegetable, animal or marine origin
(specify)
 - 13.5 Other oil and fat products
(specify where important: mayonnaise, dressings, sandwich spread)
- 14. Miscellaneous
(specify where important: spices, cooking chocolate, cocoa, yeast, other raising agents, salt, condiments, etc.)
- 15. Prepared or partially prepared mixtures of food and prepared meals obtained outside and consumed at home
(specify)
- 16. Beverages
 - 16.1 Alcoholic drinks
(specify where important: beer, wine, spirits, etc.)
 - 16.2 Canned or bottled soft drinks
(specify important varieties)
 - 16.3 Other beverages: tea, coffee, yerba, mate, etc.

II. PURCHASED FOODS EATEN AWAY FROM THE HOME

1. Meals, snacks, etc., with specification of type and quantities of the food eaten, wherever possible.
2. Alcoholic drinks, with specification of the drinks as beer, wine, spirits, etc.
3. Ice cream, soft drinks, chocolate and sugar confectionery.